



INTEGRATED PEST MANAGEMENT

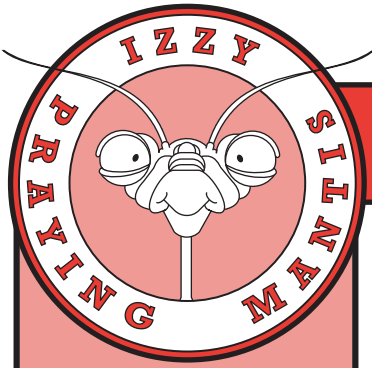
Unit 2 Section 1 Lesson 1 Ant Antics

Focus Areas: Pest Control Methods -
Organic; Science

Focus Skills: Applying the Scientific
Method to determine the effectiveness
of three organic controls on ants

Level of Involvement: MAXIMUM





*Dedicated
to Reducing
Pesticides*

Unit 2 Section 1 Lesson 1: Ant Antics

Focus Areas: Pest Control Methods - Organic; Science

Focus Skills: Applying the Scientific Method to determine the effectiveness of three organic controls on ants

Level of Involvement: MAXIMUM

Objective

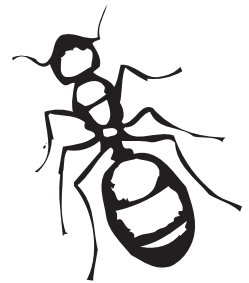
To determine the effectiveness of three organic controls on ant behavior

Essential Question

Which organic controls tested deter ants?

Essential Understanding

Chemical controls are not the only way to manage pests.



Background

Ants are social insects that live in colonies and display the behavioral characteristics associated with insects of this type. They communicate directly by touching various segments of their antennae together and indirectly by releasing chemicals onto the surfaces on which they walk. This effective communication is responsible for the busy ant trails easily observed in outdoor areas. Food and water are of prime importance to ants. Food is carried to nests and the diet is varied. In dry areas, ants may dig deep burrows for moisture, but too much moisture will send them scurrying about carrying their eggs to drier ground. Ants may relocate several times a year to maintain an acceptable environment. Inadequate food or water, as well as excess water, may cause ant infestations of buildings and therefore require control measures.

Ants are not always pests. They can be predators of other insects, which is a beneficial trait. Ants are considered pests when they invade buildings, for example, such as carpenter ants that build nests out of wooden structures or other ant species that feed on food residues in kitchens. Ants are not considered pests if they make a few anthills in the backyard, however, and can be left alone if they are not causing damage. Read the **fact sheet** on pavement ants.



University of
Connecticut
College of Agriculture
and Natural Resources
Cooperative Extension System



Unit 2 Section 1 Lesson 1: Ant Antics

Vocabulary

**exoskeleton**

hard outer skeletal material that protects an insect's soft body parts and provides support

insecticide

a chemical used to repel or reduce insect populations

organic control

a natural substance, as compared to a synthetic chemical

segmented

divided into parts

social insects

insects that live in groups and cooperate in almost every aspect of their lives

Challenge

Discover an organic substance that repels ants

Logistics

Time: 45 minutes plus time to collect ants (See Preparations)

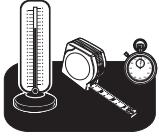
Group size: up to 25

Space: room with desks, tables or counters



Unit 2 Section 1 Lesson 1: Ant Antics

Materials



glass jars - three per group and one for control
ants - five to seven per jar

soil

cheese cloth

rubber bands

magnifying glasses

bread crumbs or cereal flakes

lemon juice

white vinegar

cayenne pepper

safety goggles

gloves

Worksheets 1A and 1B, "Lab Reports" *

Worksheet 2 "Bio Sketch Form" *

Fact Sheet Pavement Ant *

Article "Beneficial Creatures" *

Assessment for a Lab Report *

Assessment for an Expository Piece *

* single copy provided

Preparations

1. Prepare copies of Worksheets 1A and 1B, one per participant.
2. Prepare observation jars; 3 treatments and 1 control per group.
3. Fill jars 1/4 full with soil; cover with cheesecloth held taut with a rubber band.
4. Collect ants and bring them to the activity for use by the group.

To collect ants: locate an ant colony. Gently dig up the earth around the colony and allow several ants to crawl into each uncapped jar. Cap jars. Note location for ant release after the experiment. A nature guide can be used to identify the ants collected.



Unit 2 Section 1 Lesson 1: Ant Antics

Activity

Introduction

1. Display insect jars in the classroom and discuss the characteristics of ants. Classify ants by Phylum, Class (Order, Family optional). Answer: INVERTEBRATE, INSECT(Hymenoptera, Formicidae)
2. Encourage individuals to share their feelings about insects. Do they find them useful in any way or just pests? Discuss why some insects are considered beneficial.
3. Discuss what people do to control insects that are pests.
4. Introduce the term insecticide. Discuss the pros and cons of insecticide use.

Pros:

- a. Effective
- b. Fast acting
- c. Easy to apply

Cons:

- a. Danger to ecosystems - pollute water, residues persist in soil, leach through soil
 - b. Insects develop resistance, necessitating stronger chemicals or larger doses
 - c. Cost
5. Hypothesize why insects are resistant to pest controls: build up an immunity to chemicals, move to new locations if sprayed.

Homework Assignment

1. Using the Beneficial Creatures article, have individuals research and write a bio sketch on one beneficial insect, its habitat, life cycle and appearance.



Unit 2 Section 1 Lesson 1: Ant Antics

Activity

Homework Assignment (continued)

2. Distribute Worksheet 2 "Bio Sketch Form."
3. Evaluation optional

Involvement

1. Have the group observe and discuss the behavior of ants when bread crumbs or cereal flakes are added to the control jar (a jar with five to seven ants). **Note:** nothing is added to food prior to adding it to the jar.
2. Explain to the group that they will be conducting an experiment to test the effectiveness of three organic insect repellants:

lemon juice
white vinegar
cayenne pepper

CAUTION group to handle these materials carefully. They must wash their hands immediately after handling the substances. Avoid contact with clothing. **DO NOT** get these substances in their noses, eyes or mouths. Use safety goggles and gloves.

3. Put CHALLENGE on board or chart paper and read it aloud. Divide the group into teams of three to six. **Note:** If you feel the group can't be trusted to handle test materials with care, the experiment may be done as a demonstration involving a minimum number of individuals.
4. Distribute Worksheet 1A and discuss how the groups will test each substance (lab procedure). Remind the group what they did with the control jar. Ask why a control is necessary in conducting an experiment. **Answer:** To establish what normal ant behavior is in order to observe any changes when the organic controls (lemon juice, white vinegar and cayenne pepper) are introduced.



Unit 2 Section 1 Lesson 1: Ant Antics

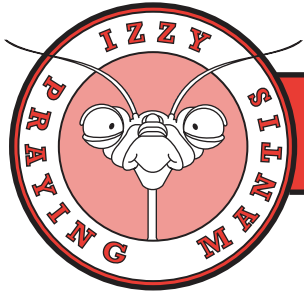
Activity

Involvement (continued)

5. Ask the group to form a hypothesis as to which substance will be the most effective natural repellent and put the results on the board/chart paper.
6. As a group, the following procedure should be followed:
 - a. Put a little of the substance to be tested on the cereal/bread crumbs.
 - b. Put the food in one of the jars with the ants.
 - c. Observe the ants in relation to the treated food stuffs and record what you observe (Results).
 - d. Repeat steps a. through c. two more times using a different jar to test each substance.
 - e. Evaluate which, if any, of the three test substances seemed effective.
 - f. Draw a conclusion.
7. Distribute lab materials and complete the experiment following steps 1 through 6.

Follow Up

1. Teams share the results of their observations and their conclusions
2. Results are compared to original choice of hypothesis
3. Discuss the pros and cons of organic vs. chemical control
4. Individuals complete Worksheet 1A and hand in for evaluation



Unit 2 Section 1 Lesson 1: Ant Antics

Answer Key

Accept any reasonable answers that can be supported by facts.

Assessment

- Option #1** Evaluate lab reports using Assessment for Lab Report.
- Option #2** Evaluate homework assignment using Assessment for an Expository Piece.

Follow Through

Focus Areas: Pest Control; Life Science

Focus Skills: Observation, drawing conclusions

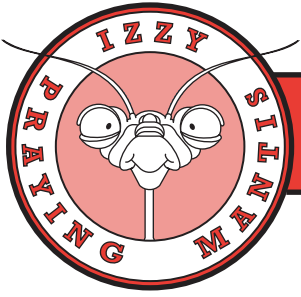
Groups observe their "test" jars the next day to determine which control(s) are still effective. Hypothesize the reason for the results obtained.

Resources



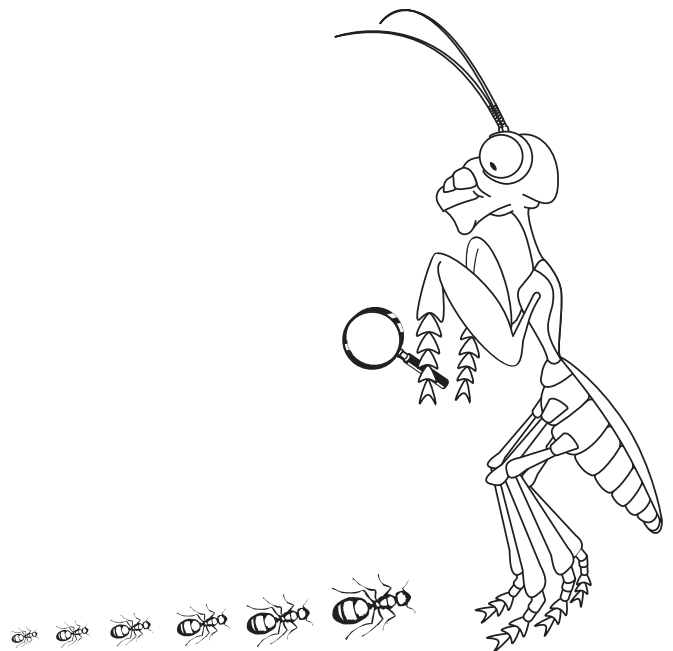
Internet Websites

- <http://www.raingardens.com>
http://ipcm.wisc.edu/programs/school/section_5.htm
<http://schoolipm.ifas.ufl.edu/doc/ants.pdf>
<http://schoolipm.ifas.ufl.edu/tp1.htm>
<http://www.hort.uconn.edu/ipm/homegrnd/htms/4termant.htm>



Unit 2 Section 1 Lesson 1: Ant Antics

Notes





Unit 2 Section 1 Lesson 1: Ant Antics

Worksheet 1A

Name: _____

Date: _____

Period/Group: _____

Lab Report For: _____

Objective: To determine which organic controls tested deter ants.

Materials: _____

Hypothesis: _____

Procedure: (what you did) 1. _____

2. _____

3. _____

4. _____

5. _____

Continue on reverse side if necessary

Results: (what you observed/discovered) _____

Conclusions/Further Questions: (what you learned or want to learn) _____



Unit 2 Section 1 Lesson 1: Ant Antics

Worksheet 1B

Name: _____

Date: _____

Period/Group: _____

Lab Report For: _____

Objective: To determine which organic controls tested deter ants.

Materials: _____

Hypothesis: _____

Procedure: (what you did) 1. _____

2. _____

3. _____

4. _____

5. _____

Continue on reverse side if necessary

Results: (what you observed/discovered) _____

Conclusions/Further Questions: (what you learned or want to learn) _____



Unit 2 Section 1 Lesson 1: Ant Antics

Worksheet 2

Bio Sketch Form: Complete the following bio sketch for a beneficial insect using the article *Beneficial Creatures* and a minimum of one other informational source.

Include:

- * reasons why this insect is considered beneficial
- * a minimum of one visual aid
- * sources used

Your report will be displayed for others in your group.

Name of organism: _____

Description of organism: _____

Description of habitat: _____

Food source(s): _____

Life cycle: _____

Why this organism is considered beneficial: _____

Sources used to prepare this report: _____



Unit 2 Section 1 Lesson 1: Ant Antics

Article

Beneficial Creatures

Nature's Pest Control

By Patti Schenck, Penn State Master Gardener



Ladybird beetle commonly known as the ladybug overwinters as an adult in leaf litter, mulch, woodpiles or in garden debris. In the spring she will feed on nectar, pollen and honeydew and lay clusters of elongated, yellow eggs. The larva is dark with orange or yellow marks and raised black spots resembling an alligator in shape. The larva feeds on aphids, scale, mites, mealy bugs, whiteflies, thrips and the eggs of other insects. To attract the ladybug grow tansy, angelica, scented geraniums and spring flowering shrubs; and don't be too hasty to get rid of all the aphids.

Mealybug destroyers resemble ladybugs but are a third of their size and are black with orange-red heads. Adult mealybug destroyers prey mainly on mealybugs but will also eat certain stages of scale and aphids. The larva resembles the mealybug because it produces white cotton to protect itself against ants.



The **ground beetle** family contains hundreds of species. Most of these insects are dark and shiny. Their larvae are segmented with strong legs and visible pinchers for grasping prey. Most hide during the day and feed at night. Do not handle them because they may pinch and some give off a disagreeable odor. The adults and larvae prey on caterpillars, cutworms, root maggots, spiders, mites, other beetles and many other insects. The best way to encourage the ground beetle is to provide places for them to hide: ground covers, perennial beds and hedgerows.

The wheel bug or **assassin bug**, **soldier beetle** and the **big-eyed bug** are of the Hemiptera family and all have piercing, sucking mouthparts. The assassin bug preys on flies, bees, leafhoppers, Japanese beetles, tomato hornworms and other large caterpillars. Although small, the big-eyed bug consumes dozens of spider mites a day. The soldier beetle preys on caterpillars, sawfly larvae, Mexican bean beetles and Colorado potato beetles.

Rove beetles are usually black or brown in color. They have short antennae and pinching jaws used to grab their prey. They scurry about with the tip of their abdomen in the air. Rove beetles prey on mites, aphids, springtails, nematodes, fly eggs and maggots. These interesting insects are attracted to dark, damp places and would be happy in a compost pile, under leaves, stones and boards.



The **lacewing** is a delicate looking creature with long, lacy wings and copper-colored eyes. The adults lay eggs attached to the end of filaments on leaves near aphids. The grayish brown larvae emerge ready to eat anything in their reach with their prominent sharp curved jaws. They can consume 100 or more insects a day. To attract the lacewing grow yarrow, angelica, sunflowers, scented geraniums, Queen Anne's lace or corn.



Unit 2 Section 1 Lesson 1: Ant Antics

Article

Beneficial Creatures

Nature's Pest Control

Tachinid flies resemble a large housefly but are bristle-covered and gray or brown with pale markings. They are often seen on or around flowers where they feed on the nectar. The female lays her eggs on a pest insect or on the leaves, which are then eaten by the host insect. The eggs hatch and the maggots develop within the host insect, eventually killing it. The maggot leaves its dead host and drops to the ground where it pupates. Tachinid flies prey on caterpillars, beetles, sawflies, borers and stinkbugs. Wildflowers and herbs such as tansy, spearmint, dill and Queen Anne's lace will attract them.



Hover flies resemble wasps but have only one set of wings and do not sting; they are also called syrphid or flower flies. The adult is not predacious but is very beneficial as a pollinator. By closely observing the fly you can distinguish it from a bee or wasp by its movements. The hover fly will dart quickly in and around a flower while a wasp or bee will land and remain for awhile. The pale, greenish brown, sluglike maggot will consume 400 aphids before changing into an adult. They also eat leafhoppers, scale, mealybugs, thrips, corn borers and corn earworms. Eggs are laid singly among aphid colonies. Cosmos, coreopsis, marigolds, feverfew, parsley and spearmint are some of the herbs and flowers that will provide the pollen and nectar that they need.

All **wasps** have a physical feature that makes them different from other insects in that they have a narrow waist. Adult wasps have chewing mouthparts and tongue-like structures they use for drinking nectar. Females of most species have stingers. Most wasps are beneficial as pollinators, predators, and/or parasitoids. Oxeye daisies, strawflowers, black-eyed Susans, yarrow and even goldenrod will draw wasps to the garden.

Spiders have eight legs and two body parts and belong to a group called arachnids. Most spiders spin webs to entangle their prey but some use their environment like crab spiders who camouflage to match the flowers they hide in. **Wolf spiders** are named for their coloring and method of hunting. They live mainly on the ground and burrow for shelter. To encourage spiders provide mulch, especially straw and a diversity of flowers.

Some **nematodes** are very destructive but others are extremely beneficial. These microscopic roundworms attack many soil-dwelling and pupating insects. The species *Steinernema carpocapsea* or *Sc* is used for caterpillars, cutworms, webworms and billbugs. *Heterorhabditis bacteriophora* or *Hb* is used to control Japanese beetle grubs. Research is also being done to see if they would be effective to control termites.



Unit 2 Section 1 Lesson 1: Ant Antics

Assessment for a Lab Report

1. Title clearly reflects purpose	10 points	_____
2. Objective explains purpose	10 points	_____
3. Material list is accurate and complete	10 points	_____
4. Procedure is accurate, clear and complete	20 points	_____
5. Results are detailed, clear and relevant	20 points	_____
6. Conclusion and/or Question reflects an understanding of the lab's purpose	20 points	_____
7. Report is neatly done	5 points	_____
8. Report is mechanically correct	5 points	_____
Comments:	Total Points	_____

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7. Report is neatly done	5 points	_____
8. Report is mechanically correct	5 points	_____
Comments:	Total Points	_____



Unit 2 Section 1 Lesson 1: Ant Antics

Assessment for an Expository Piece

- | | | | |
|-----|---|-----------|-------|
| 1. | The introduction clearly states the thesis/purpose of the piece. | 10 points | _____ |
| 2. | The material included is both relevant and accurate. | 20 points | _____ |
| 3. | Each paragraph presents a main idea. | 10 points | _____ |
| 4. | Each paragraph presents relevant supporting details. | 10 points | _____ |
| 5. | The focus of the piece is maintained throughout. | 10 points | _____ |
| 6. | The transitions are smooth and logical. | 5 points | _____ |
| 7. | The material is well organized. | 10 points | _____ |
| 8. | The paper is neat and presentable. | 5 points | _____ |
| 9. | The writing is mechanically correct. | 10 points | _____ |
| 10. | The conclusion summarizes the main points in a thoughtful manner. | 10 points | _____ |

Comments:

Total Points _____



Pavement Ant

Contact: Eric Day, Manager, Insect Identification Laboratory

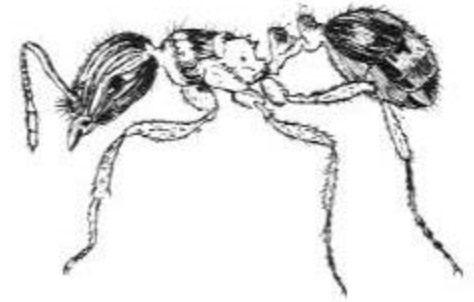
August 1996

Pavement Ant

SIZE: 1/10 to 1/8 inch (2-3mm)

COLOR: Brown to black

DESCRIPTION: The pavement ant is a small, brown to black ant with pale legs and a black abdomen. Pavement ants feed on a variety of materials, including live and dead insects, honeydew from aphids, meats, grease, etc. They often enter houses looking for food. They may become numerous in a short period of time in a kitchen or outside on a patio.



HABITAT: Pavement ants are very common in the eastern United States. These small, brown to black ants usually nest under stones, concrete slabs, at the edge of pavements, and in houses in crevices in woodwork and masonry.

LIFE CYCLE: New ant colonies are started by a single queen that lays the eggs and tends the brood that develops into worker ants. Tending of the brood is then taken over by the workers, which shift the brood from place to place as moisture and temperature fluctuate in the nest. When workers forage for food for the queen and her young, they often enter houses and become a nuisance.

TYPE OF DAMAGE: They feed on animal food, grease, seeds, etc.

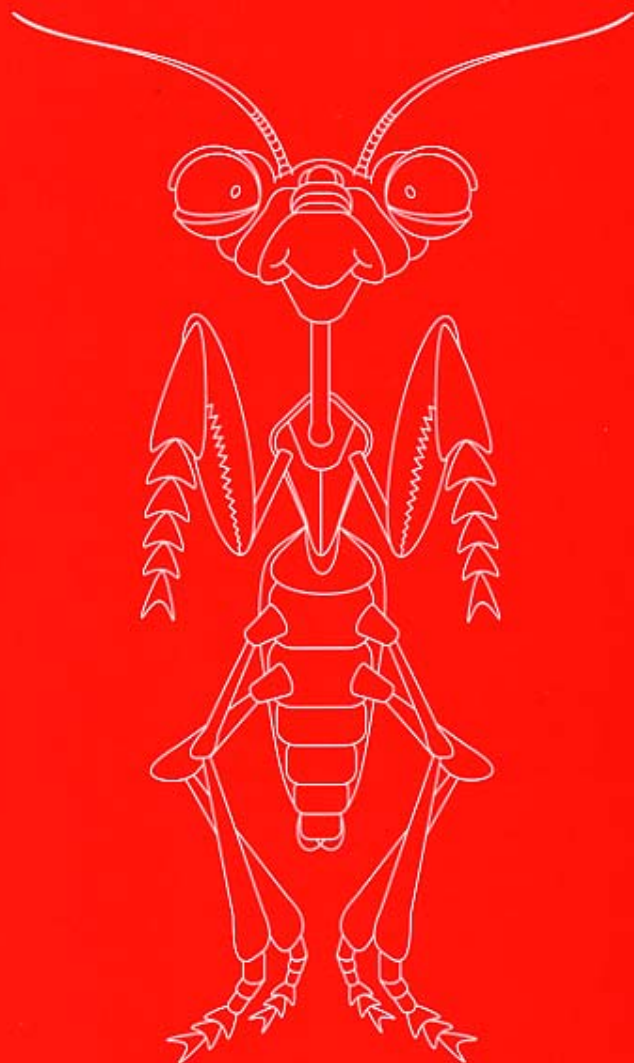
CONTROL: The nests are often difficult to locate, so control is usually aimed at individual ants or groups of ants.

INTERESTING FACTS: Ants feed on almost anything consumed by humans.

Visit [Virginia Cooperative Extension](http://www.ext.vt.edu/departments/entomology/factsheets/pavement.html)



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"Pavement Ant Fact Sheet"

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